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# The Risk of Hypertension Over 16 Years and Family and Job Stress in Female Population 25 - 64 Years in Russia/Siberia

**Gafarov V[1,2]*, Panov D[1,2], Gromova E[1,2], Gagulin I[1,2] and Gafarova A[1,2]**

*[1]FSBI Institute of Internal and Preventive Medicine, Novosibirsk, Russia*

*[2]Collaborative laboratory of Cardiovascular Diseases Epidemiology, Novosibirsk, Russia*

***Corresponding Author:** Gafarov V, Professor, The Head of Laboratory Psychological and Sociological Issues of Internal Diseases Institute of Internal and Preventive Medicine and The Head of Collaborative laboratory of CVD Epidemiology, Novosibirsk, Russia.

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## Abstract

**Objective:** To determine the effect of family and job stress on risk of an arterial hypertension (AH) in female population aged of 25 - 64 years over 16 years of follow-up.

**Methods:** In framework of the WHO "MONICA-psychosocial" a random representative sample of women aged 25 - 64 years (n = 870) who were residents one of the district in Novosibirsk was examined in 1994. Stress in the workplace has been studied using the Karasek scale, stress in the family with using the scale "Awareness and attitude towards the health". Over the 16-years (1994 - 2010) all cases of new-onset hypertension were revealed in the cohort.

**Results:** The prevalence of family and job stress levels in female population aged 25 - 64 years were 20.9% and 31.6%, respectively. High stress levels are associated with low self-rated health, with a high frequency of complaints, lack of awareness about prevention methods. Over16 years the risk of AH was 1.39-fold higher in women with family stress. The stress associated with workplace significantly increased HR of hypertension in 1.28 times. The incidence of hypertension was higher in married women experiencing stress in the family and at work, with higher levels of education, in category "executives" and "physical labor".

**Conclusion:** There is a high prevalence of family and job stress levels in female population aged 25 - 64 years. Women with stress have a higher risk of hypertension over 16 years associated with the social gradient.

***Keywords:*** *Stress in the Family; Workplace Stress; Risk of Hypertension*

## Background

Recent studies emphasize the health status and the presence of chronic diseases are associated with the growing effect of social interaction in the population. Unfavorable relationships in the family (with children, the spouse) have a negative impact on self-assessment of health and are associated with a high incidence of chronic diseases reporting [1]. Women often experience difficulties in maintaining a balance between career and family values, combining the roles of mothers, spouses and duties of the employee in conditions where the family institution assumes the priority of household duties.

Work duties and tasks contrary to family life reduce job satisfaction in the period of adverse social and economic challenges along with an increasing proportion of women working in positions requiring more time [2]. Modern concepts identify this role conflict as a key component in the genesis of somatic pathology [3].

Recent studies exploring social integration in the context of interactions in the family and in the workplace, have some limitation in the absence of classical epidemiological approaches in studying the risk of developing chronic non-communicable diseases. The study of stress at workplace and in the family, identifies groups that are susceptibility to stress stratified by age, sex, occupational class and level of education. It has a long term contributes to the development of theoretically based methods of prevention at the workplace. The purpose of the survey is to determine the effect of stress in the family and at workplace on risk of an arterial hypertension (AH) in female population aged of 25 - 64 years over 16 years of follow-up.

## Methods

Within the framework of the third screening (1994) of the WHO programme ‘‘Multinational Monitoring of Trends and Determinants of Cardiovascular Disease’’ (MONICA) and subprogramme ‘‘MONICA-psychosocial (MOPSY)’’ [4], a random representative sample of women aged 25 - 64 years (n = 870, Table 1) from one of Novosibirsk’s districts was carried out. This representative sample was generated on the basis of the electoral lists of citizens using a table of random numbers. This survey was performed using the standard methods accepted in the ‘‘MONICA study’’ protocol. The programme of psychosocial screening examinations included the registration of social characteristics, such as marital status, level of degree, professional class and psychosocial tests.

| Age groups | n | % |
|---|---|---|
| 25 - 34 | 214 | 24.6 |
| 35 - 44 | 192 | 22.1 |
| 45 - 54 | 231 | 26.6 |
| 55 - 64 | 233 | 26.8 |
| 25 - 64 | 870 | 100.0 |

***Table 1:*** *Demographic data surveyed in the third screening of the WHO MONICA, 1994.*

Levels of job stress were measured using Karasek’s scale; family stress is with using the questionnaire “Knowledge and attitude to the health” [5,6], accepted in the ‘‘MOPSY’’ protocol. The evaluation of each question was calculated in points, summed up in a common scale, which was divided into tertils. Thus, the severity of stress was assessed as: low, moderate, high.

The cohort (N = 560) was formed after excluding women with the following: hypertension, stroke, myocardial infarction, coronary artery disease without MI, as well as diabetes mellitus at the baseline screening. For the 16 years (1995 - 2010) of study, new-onset AH incidences were registered by means of examination, analysis of medical histories, cards and death certificates. AH was determined as blood pressure level ≥ 140/90 mmHg and/or intake of antihypertensive drugs (Table 2).

| | Family stress | AH rates | Job stress | AH rates |
|---|---|---|---|---|
| Yes | 347 / 69,1% | 171 / 66,5% | 435 / 82,2% | 220 / 80,3% |
| No | 155 / 30,9% | 86 / 33,5% | 894 / 17,8% | 54 / 19,7% |
| All | 502 / 100% | 257 / 100% | 529 / 100% | 274 / 100% |

***Table 2:*** *The incidence of AH over 16 years for women aged 25 - 64 years with family and job stress.*

Validation and processing of material under the WHO program “MONICA-p psychosocial” was carried out in the Information Collection Center “MONICA”, Helsinki (Finland). Quality control was carried out in the quality control centers “MONICA”: Dundee (Scotland), Prague (Czech Republic), Budapest (Hungary). The presented results are considered satisfactory. Statistical processing was fulfilled by means of

programme pack SPSS version 11.5. Cox-proportional regression model used estimated relative risk (hazard ratio - HR) taking into account different time intervals. Persons with AH excluded from the analyses while processed. The Chi-square test used to test the statistical significance of differences between groups ($x^2$); $p < 0.05$ was considered statistically significant.

## Results

The prevalence of high levels of family stress in female population aged 25 - 64 was 20.9%. There are tendencies of increasing the frequency of family stress in the youngest (25 - 34 years) - 27.6% and middle age group (45 - 54 years) - 30.5%. Moderate stress levels in the family were determined in 48.2% of women 25-64 years (Table 3). The prevalence of high levels of job stress in female population aged 25-64 years was 31.6%; 50.7% of women had moderate stress level. Share of women with a high level of stress at work did not differ significantly in all age groups.

| Age group | Family stress | | | | | | Job stress | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | High | | Average | | Low | | High | | Average | | Low | |
| | N | % | N | % | N | % | N | % | N | % | N | % |
| 25 - 34 | 29 | 27.6 | 61 | 25.2 | 36 | 23.2 | 38 | 22.8 | 66 | 24.6 | 22 | 23.4 |
| 35 - 44 | 18 | 17.1 | 60 | 24.8 | 34 | 21.9 | 42 | 25.1 | 57 | 21.3 | 22 | 23.4 |
| 45 - 54 | 32 | 30.5 | 62 | 25.6 | 45 | 29 | 41 | 24.6 | 76 | 28.4 | 30 | 31.9 |
| 55 - 64 | 26 | 24.8 | 59 | 24.4 | 40 | 25.8 | 46 | 27.5 | 69 | 25.7 | 20 | 21.3 |
| 25 - 64 | 105 | 100 | 242 | 100 | 155 | 100 | 167 | 100 | 268 | 100 | 94 | 100 |
| $\chi^2 = 3.267$ df = 6 p > 0.05 | | | | | | | $\chi^2 = 3.025$ df = 6 p > 0.05 | | | | | |

***Table 3:*** *Levels of family and job stress depending on age group in the female cohort 25 - 64 years.*

The relationship between individual indicators of family and job stress was assessed. It was found that 12.8% of women with frequent serious conflicts in the family do not have the opportunity to "relax and have a rest after a normal working day" compared to 5.1% of those without conflicts ($\chi^2 = 38.42$ df = 12 $p < 0.001$). More than half of those women who dislike their job or like their work very much had someone who seriously ill or died in the family over 12 months (61.1% and 52.2%. respectively). For comparison share of persons with "sick or dead" relatives was 33.1% among those who asked: "Do you like your work?" and answer "middling" ($\chi^2 = 36.05$ df = 8 $p < 0.001$). 50% of women with "sick or deceased relatives" deny the opportunity to relax and have a rest after a normal working day. But 75.8% indicates a permanent rest after work in the absence of illness or death of relatives throughout the year ($\chi^2 = 15.12$ df = 8 $p = 0.057$). For women with very high responsibility at work, frequent serious conflicts in the family are observed in 40%; for persons with low or middle levels of responsibility this share is 16.7% and 8.8%, respectively ($\chi^2 = 26.31$ df = 12 $p = 0.01$). People who report an increase or decrease in responsibility at the workplace during the year have a directly increased/decreased efficiency ($\chi^2 = 24.14$ df = 6 $p < 0.001$).

The relations of family stress and attitudes toward the health and methods of cardiovascular prevention was studied in women. Persons who are "disturbed by a rest at home" are more likely had complaints about their health than those who can afford to rest - 92.1% and 82.9%, respectively ($\chi^2 = 7.32$ df = 1 $p < 0.01$). Women without serious conflicts within the family are three times more likely to trust the opinion of a doctor. While those with frequent serious conflicts in the family have more confidence in their well-being and do not necessarily agree with the opinion of the doctor ($\chi^2 = 14.61$ df = 6 $p < 0.05$). Those who are prevented from quietly relaxing at home are less likely to trust the opinion of the doctor compared to those with a relaxed home environment (24% and 38.8%, respectively; $\chi^2 = 9.24$ df = 2 $p = 0.01$). In answering the question: "If you feel not so good at workplace, what do you do?" women with several changes

in family/marriage status over 12 month (married, divorced, left the family, widowed, the child was born, other) stop the work and seek medical help 2-times more often then without changes in family ($\chi^2$ = 9.52 df = 4 p < 0.05). Women with seriously ill or deceased relatives (within 1 year) are more likely to report a high probability to be ill in the next 5-10 years then without it (65.4% and 49.6%; $\chi^2$ = 9.96 df = 4 p < 0.05); they rarely believed in the possibility of medicine to successfully treat heart diseases (26.3% and 37.5%; $\chi^2$ = 18.02 df = 8 p < 0.05). We found some tendencies as follows: Only 6% of people with seriously ill or deceased relatives (within 1 year) regularly check their health; Persons with frequent serious conflicts in the family 2 times more often do not seek medical help even with the appearance of severe pain or discomfort in the region of the heart then without it (31.4% and 18.8% respectively, P > 0.05).

With regard to the relationship of job stress with an attitude toward the health it was found. in women with complaints about their health only 46% of them say "I like my work". The proportion of people with a positive attitude toward their work is 68.8% among those who do not have health complaints ($\chi^2$ = 10.85 df = 4 p < 0.05). A positive self-rated health associated with 3-fold decrease in reducing of working capacity during the year compared to "fair" or "poor" estimation (12.9% and 36.2%, respectively; $\chi^2$ = 14.76 df = 3 p < 0.01).

Women who have changed work place or replacement the head are more likely to report a high chance of developing a serious illness in the next 5 - 10 years (62.3% and 60%) then those who replace subordinates or having conflicts with the authorities (25% and 47.6%, respectively; $\chi^2$ = 24.38 df = 12 p < 0.05). Persons whose responsibilities at work have decreased during the year in 2 times more likely to believe in the possibility of medicine to successfully treat heart diseases compared to those with increased liabilities (21.4% and 8.9%, respectively; $\chi^2$ = 19.09 df = 8 p < 0.05). Women who assess their responsibility at work as insignificant and those with very high responsibility are more likely report they have never experienced pleasant emotions associated with medical care utilization compared to those with average responsibility's level (60%, 50% and 38%, respectively; $\chi^2$ = 24.79 df = 12 p < 0.05). Depending on the presence or absence of the opportunity to "relax and have a rest after normal working day during the last 12 months" women report at least once experienced pleasant emotions associated with medical care - 64.5% and 57.1%, respectively ($\chi^2$ = 29.67 df = 16 p < 0.05). There is a growth associated with increasing of their job responsibility from 31.6% to 76% in share of women continuing to work in case of a malaise or influenza ($\chi^2$ = 17.88 df = 6 p < 0.01). 90% of women whose ability to work during the last 12 months has significantly decreased in answering the question "Can a healthy person of your age avoid some serious illnesses if they take preventive measures in advance?" consider "Can certainly". 56% and 71.7% of respondents with unchanged or increased work capacity report the same answer ($\chi^2$ = 16.63 df = 6 p < 0.05).

The relations of family and job stress with the social characteristics were studied in women with incidences of AH.

The structure of marital status in a cohort of women experienced family stress with AH was: never been married -4.7%; married -78.9%; divorced -9.4%; widowed -7.0%. The structure is the same for job stress: never been married -5.5%; married -76.8%; divorced -10.9%; widowed -6.8%. There have been trends in increasing the incidence of hypertension in a group of married women with a high level of family and job stress compared with unmarried women, divorced and widowed ones.

The structure of education in a cohort of women experienced family stress with AH was as follows: university - 28.6%; incomplete higher/vocational education - 36.9%; high school - 19.6%; elementary - 14.9%. AH incidence were found more likely in those with university/college and high school educational level and stress in the family compared to those with elementary education with ($\chi^2$ = 5.63 df = 1 p < 0.05; $\chi^2$ = 4.01 df = 1 p < 0.05, respectively) and without stress ($\chi^2$ = 5.45 df = 1 p < 0.05; $\chi^2$ = 4.39 df = 1 p < 0.05, for university/college and high school, respectively).

The structure of education in a cohort of women experienced job stress with AH was as follows: university - 28.9 %; incomplete higher/vocational education - 33.5%; high school - 20.2%; elementary - 17.4%. Women experienced job stress are more likely had a higher rate of AH in all groups where education was upper the elementary level (p for all < 0.05).

Professional status in women experienced family stress with AH was presented in the following categories: 0.6% - executives; 6.7% -middle managers; 8.5% -first-line managers; 18.3% -engineers; 1.2% -working hard labour; 14.6% - moderate physical labour; 18.3% -working light labour; 0.6% - students; 22.0% -retirees; 9.1% - military servants. The rate of AH in women engaged in managers ($\chi^2$ = 3.55 df = 1 p = 0.06) and physical labour ($\chi^2$ = 8.14 df = 1 p < 0.01) with family stress was higher compared to retirees with or without stress.

Professional status in women experienced job stress with AH was presented in the following categories: 0.5% - executives; 6.7% -middle managers; 11.5% -first-line managers; 18.2% -engineers; 0.5% -working hard labour; 14.8% - moderate physical labour; 16.7% -working light labour; 1.0% - students; 22.0% -retirees; 8.1% - military servants. The rate of AH in women engaged in physical labour with job stress was higher compared to retirees with stress ($\chi^2$ = 5.47 df = 1 p < 0.05).

Risk of AH incidence was 1.39-fold (95.0% CI: 1.08 - 1.78; p = 0.01) higher in women with family stress compared to those without it over 16 years of follow-up (1994 - 2010 yy).

HR of AH in women with job stress during 16 years of follow-up was 1.28-fold higher than in those without stress (95.0% CI: 1.02 - 1.60; p < 0.05).

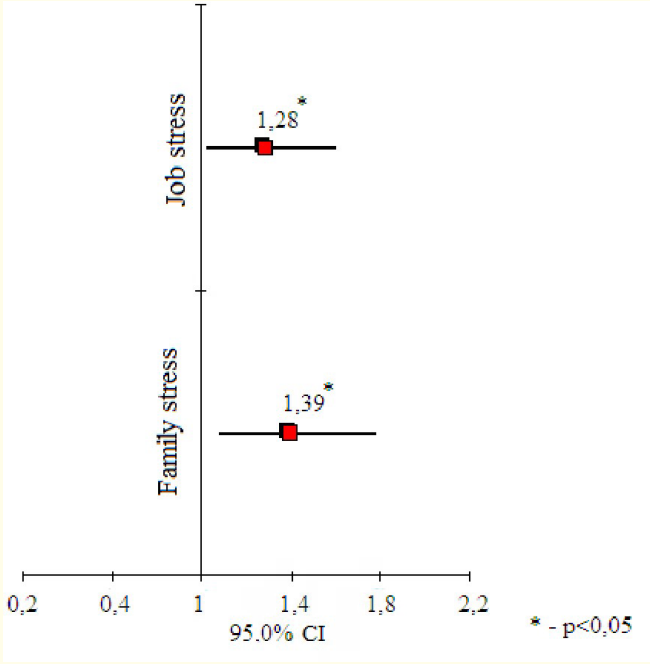


***Figure 1:*** *The risk of hypertension in women experiencing job and family stress in general population of 25 - 64 years over 16 years.*

## Discussion

We found the prevalence of high family stress levels in female population of working age is 20.9%. Tendencies of increasing the frequency of stress were found in the younger and middle age groups. Modern views point to the multiplicity of stressors of the family level

and their equivalence in relation to psychological and physical consequences. According to foreign researchers, the frequency of family conflicts is 11%; incomplete families associated with psychological trauma are found in 24% in epidemiological samples [7]. Accordingly, the National Stress Survey in Australia the reported stress is associated with family causes in 45%, mainly in younger (18 - 25 years) and middle aged groups (36 - 45 and 46 - 55 years) where this association is reached a peak - 55% [8].

The obtained results show that every third woman living in a megapolis experiences stress at the workplace in the conditions of Western Siberia. According to the Center for Health Research of Workers in the United States in 2013 year 23% of women reported high and extremely high job stress [9]. The highest levels of stress at work are found in the developing countries of Eastern Europe and the lowest levels of stress in the UK and the Netherlands [10,11].

A distinct conflict "family-career" is present when studying the relations of family and job stress. Women demonstrate higher levels of responsibility in the workplace, increased efficiency, greater loyalty or in the contrary loss of interest in their work in the presence of family stressors like conflicts in the family, the presence of sick or recently deceased close relatives, the lack of opportunity to relax after a working day. These results are consistent with recent studies in which high demands, stress and strain at work as well as a younger age are the strongest predictors of the work-family conflict in women. The loss of parental, marital and other forms of social support in the family only aggravates this pathological pattern [2].

It is determined that family stressors are reliably associated with a higher frequency of health complaints; such persons more likely to report a high probability to be ill for the next 5 - 10 years, less check their health on a regular basis even with severe pain in the heart and trust their own well-being more than the opinion of the doctor. It is evidence that family conflicts and lack of support in the family are associated with poor health and insufficient awareness of the use of medical resources. These observations were obtained in other countries too [12]. Accordingly, our findings women with changed in family status throughout the last year (married, divorced, a child was born, left a family, etc.) in 2-times are less likely to continue to work and seek medical help. The findings are supported by recent foreign studies in which negative changes in marital status (more often is the disintegration of the family and/or the role of single mothers) associated with adverse effects on physical and mental health [13,14]. It should be noted that in the structure of studied female population more than 70% are married women. This is the most vulnerable and target group for improving awareness and preventive programs taking into account reported family stressors. It should also be recognized that the negative impact of stress and the role-playing work-family conflict on well-being and health status can be largely mediated by satisfaction from maternal care for women [15].

The study of associations the job stress with an attitude toward health shows significant decrease in working capacity and loyalty to work with a deterioration of self-rated health and the presence of health complaints. Persons who have had a change of job or chief-manager are more likely to report a high probability to be ill in the next 5 - 10 years. Persons with high responsibility at work experienced less pleasant emotions during medical care. Probably, in this regard, they more often remain at work in case of a malaise or flu. Inadequate access to medical care with a high probability of illness shows low awareness about the health and preventive measures. At the same time, 90% of women realize that they do not use enough health resources to prevent serious diseases, only if they have a decline in working capacity and an appearance of health complaints. Complaints of health and malaise at work are often associated with high levels of job stress in women [17]. At the same time, inadequate care for one's health and low awareness in conditions of hard work is associated with an unfavorable lifestyle and cardiovascular risk factors [18]. It can act as one of the pathogenetic ways of deteriorating health and incidence of cardiovascular diseases.

In earlier publications, we pointed to a low level of awareness and assessment of health among the female and male population which is especially evident during the period of socioeconomic deprivation [5]. In the face of high levels of family and job stress this unfavorable trend is further strengthened.

Stress in the family significantly increases the risk of hypertension in female population aged 25 - 64 over a long-term follow-up - 16 years. This is consistent with the data of other researchers according to which low family cohesion and the overcoming of family problems is associated with increased blood pressure [18,19]. Probably this explains the tendencies of increasing hypertension rates in married women with family stress in comparison with the divorced and widowed. A recent study of couples has shown that increased demands on the spouse/partner realize its effect on BP only in conditions of high levels of stress and this effect may be protective [20]. It becomes clear that the impact of individual stressors in those with family stress should be interpreted with caution taking into account age, sex and type of studied population. It was shown persons with higher level of education experienced family stress are more likely have AH compared to women elementary education. The presence of family stress eliminate the protective effect of education on cardiovascular health which is also typically for other psychosocial factors [21]. A significantly high hypertension rates were observed in "manager/executives" and "physical labor" occupational categories. Studies in recent years show the presence of job authority as an attribute of the status of a leader expose women to interpersonal stressors and undermine their health benefits [22]. The prevalence of modifiable cardiovascular risk factors in the category of "physical labor" combined with stress determinates the high rate of hypertension in this occupational group [23].

In our study, work-related stress by a quarter increases the risk of AH in women of a general population. The association of job stress with hypertension was also demonstrated on the basis of other studies [24,25] but only in the Belgian Job Stress Study work-related stress increased blood pressure in women [26]. Women experiencing stress at work had a higher incidence of hypertension in all groups where education was upper the elementary level. This is consistent with the results of a recent study in which the psychological imbalance in access of resources at the workplace exacerbates the association of stress with anxiety only in individuals of high socioeconomic status [27]. Our findings indicate a high frequency of hypertension in physical labours who had job stress. As well as a large proportion of women who cannot relax after a working day and something disturb them from relaxing in the family. In prospective studies, it has been proven incomplete recovery after work is a predictor of a high risk of cardiovascular mortality among manual workers [28].

## Conclusions

Our findings showed the prevalence of severe stress level in the family and workplace in female population aged 25-64y in Russia/Siberia is high and it is 20.9% and 31.6%, respectively. The high frequency and close relations of stressors in conditions of social and economic strain induce the "family-career" imbalance in women of working age.

In female population aged 25 - 64y high levels of stress are associated with poor self-rated health, high frequency of complaints about their health, insufficient of awareness about preventive measures.

In female population aged 25 - 64y risk of AH is 1.39-fold higher in women with family stress. Work-related stress significantly increases AH risk in 1.28-times. Rates of hypertension are higher in married women experiencing family and job stress with a higher level of education in the category of "executives/managers" and "physical labor".

## Conflict of Interest

Authors declare no conflict of interest.

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